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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Atty. Docket
MAREIKE KLEE ET AL.	PHD 99,046
Serial No. 09/541,765	Group Art Unit 2831
Filed: April 3,2000	Examiner E.THOMAS

Title: VOLTAGE-DEPENDENT THIN-FILM CAPACITOR

Commissioner for Patents
Washington, D.C. 20231

Sir:

Enclosed is an original plus two copies of an Appeal Brief in the above-identified patent application.

Please charge the fee of $310.00 to Deposit Account No. 14-1270.

Respectfully submitted,

By Norman N. Spain
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CERTIFICATE OF MAILING

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COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

On April 4, 2003

By Elissa DeLucy

THE UNITED STATES PATENT AND TRADEMARK OFFICE

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APPEAL BRIEF

Sir:

This is an appeal from the Final Office Action of November 20, 2002. A Notice of Appeal was filed February 11, 2003.

The claims standing in this case are1-12. Claims 1-12 are on appeal.

1.REAL PARTY IN INTEREST

The real party in interest is the assignee, U.S. Philips Corporation, a Delaware corporation, N.V. Philips Electronics, a corporation of the Netherlands, is the ultimate parent of U.S. Philips Corporation.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences, known to the Applicants or the assignee, that would in any way affect, or be affected, or have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

The claims standing in this case are 1-12. Claims 1-12 are on appeal.

4.STATUS OF AMENDMENTS

The Rule 116 Amendment filed April 29, 2002 has been entered.

5. SUMMARY OF THE INVENTION

The invention as described on page 1, line 1-page 4, line 9 and as defined by the claims on appeal is directed to a ceramic passive component comprising a carrier substrate, at least a first electrode disposed on the carrier substrate, at least a dielectric disposed on the first electrode and at least a second electrode disposed on the dielectric.

As shown on page 1, lines 3 and 4 of the specification, and as defined by Claims 9-12, the invention is also directed to components comprising one or more of components of the above-noted construction.

As shown on page 1, lines 5-21 of the specification a well known use of variable-capacitance diodes is in the field of mobile telephony. As shown in lines 16-21 of the specification the problem exists that while the present trend in the field of mobile telephony is towards lower voltages and higher frequencies, the construction of variable-capacitance diodes that meet these requirements becomes increasingly difficult especially if the dimensions of the components have to be as small as possible. Additionally, as shown in this portion of the specification, additional problems are that the effective series resistance of the variable-capacitance diodes is such as to limit their possibilities and the high cost of their manufacture.

As shown on page 1, lines 22-24 of the specification, it is an object of the invention to provide a component which has a tunable capacitance, a low effective series resistance and can be inexpensively manufactured.

According o the invention as described on page 1, line 25-page 4, line 9 of the specification and as defined by the Claims on appeal, this object is achieved by a ceramic passive component comprising a carrier substrate, at least one first electrode formed of a material selected from the group

consisting of metals and alloys, having a first surface disposed on the substrate, at least one thin film dielectric of a thickness of about 0.25-0.75μm microns and comprising a ferroelectric ceramic material with a voltage-dependent relative dielectric constant having a first surface disposed on a second surface of the at least one first electrode and a second electrode disposed on a second surface of the at least one film dielectric opposing the first surface if the at least one film dielectric.

Page 2, lines 12-31 describe and Claim2 defines an embodiment of the ceramic passive component of the invention in which the ferroelectric ceramic material has a preferred composition.

Page 3, lines 1 and 2 of the specification describes and Claim 3 defines a preferred embodiment of the invention in which the first and/or the second electrode comprise(s) at least a first and a second electrically conducting layer.

According to a preferred embodiment of the invention, described on page 3. Lines 3-5 of the specification and defined by Claim 4, the first electrically conducting layer of the electrodes comprises Ti,Cr,Ni_xCr_y($0 \leq x \leq 1, 0 \leq y \leq 1$) or Ti_xW_y($0 \leq x \leq 1, 0 \leq y \leq 1$).

According to a further preferred embodiment of the invention, described on page 3, lines 6-7 of the specification and defined by Claim 5, the second conducting layer of the electrodes comprises a metal or an alloy.

According to an additional preferred embodiment of the invention, described on page 3, lines 11-18 of the specification and defined by Claim 6, the carrier substrate comprises a ceramic material, a ceramic material with a glass planarization layer, a glass-ceramic material, a glass material or silicon.

According to an additional preferred embodiment of the invention, described on page 3, lines 19-23 of the specification and defined by Claim 7, the dielectric comprises multiple layers.

According to a further preferred embodiment of the invention, described on page 3, lines 24-27 of the specificatio in and defined by Claim 8, a protective layer is laid over the entire component.

The specification further describes on page 3, line 28-page 4, line 5 of the specification and Claims 9, 10 and 11 respectively define voltage-controlled oscillators, filters and delay lines employing a ceramic passive component of the invention.

Page 4, lines 6-9 of the specification describes and Claim 12 defines an embodiment of the invention wherein a capacitive component comprises a ceramic passive component of the invention.

The invention is described in greater detail on page 4, line 12-page 8, line 13 of the specification with reference to the figures of the drawing.

In the drawing Fig. 1 is a diagrammatic cross sectional view of a ceramic passive component of the invention, Fig. 2 is a graph showing the capacitance as a function of applied voltage of a ceramic passive component of the invention, Fig 3 is a circuit diagram of an RCL filter, Fig. 4 is a graph showing the filter characteristic of an RCL filter comprising a ceramic passive component of the invention as its capacitive component and Fig. 5 is a circuit diagram of a passive LC delay member.

In Fig 1 of the drawing 1 is the carrier substrate, 2 is the first electrode comprising a first electrically conducting layer 3, and a second electrically conducting layer 4, 5 is the dielectric, 6 is the second electrode and 7 is a protective layer.

6. ISSUES

The issues in this case are whether Claims 1-12 are rejectable under 35 U.S.C. 103(a) as unpatentable over Malone et al.

7. GROUPING OF CLAIMS

Claims 1-3 and 5-12 are considered to be patentable for similar reasons and stand together. Claim 4 is considered to be patentable for additional reasons and stands by itself.

8. ARGUMENT

The rejection of Claims 1-3 and 5-12 under 35 U.S.C.103 (a) as unpatentable over Malone et al. is considered to lack merit.

The Malone et al. patent is not considered to teach, or even suggest, the ceramic passive component defined even by Claim 1, the most generic claim.

Unlike the ceramic passive component defined by Claim 1, the ceramic passive component of the Malone et al., the voltage variable capacitor array, does not have a thin film dielectric comprising a ferroelectric ceramic material with a voltage-dependent relative dielectric constant and of a thickness in the range of 0.25-0.75μm having a first surface provided on a surface of a first electrode and having a second electrode provided on the surface of a second surface of the dielectric opposite its first surface. Instead, as shown in column 2, line 18-column 44, line 42 and Fig. 1 the ceramic passive component of the Malone et al. patent has a dielectric block 152, of an unspecified thickness comprising a ferroelectric ceramic material positioned between metallic layers 154.

Clearly, the lack of any teaching, or even suggestion, in the Malone et al. patent that the dielectric block 152 may be a thin film specifically with a thickness in the range of 0.25-0.75μm provides no teaching, or even suggestion, to a person of ordinary skill in the art to choose to use only a thin film dielectric of a thickness in the range of 0.25-0.75μm.

The decision in In re Rose, 105 USPQ 237, cited by the Examiner in the Final Office Action, is not considered to be applicable to the instant case. Unlike the claims involved in the instant case, the claims involved in In re Rose did not recite specific range of numerical values but recited only relative (non-numerical) values.

The rejection of Claim 4 under 35 U.S.C. 103(a) as unpatentable over Malone et al. is considered to lack merit for reasons given in regard to parent Claim 1 and in the failure of the Malone wt al. patent to teach, or even suggest, that any of the metallic layers 154 contacting the blocks of voltage variable material 152 comprise any of the materials recited in Claim 4.

It is considered that the decision in In re Leshin, 125 USPQ416, cited by the Examiner in the Final Office Action, is not applicable to the instant rejection of Claim 4 as unpatentable over Malone et al. Unlike the Malone et al. patent, the claims in In re Leshin recited the use of plastic in a container for cosmetics while the reference applied against the claims, Anderson, U.S. Patent No. 2,506,984, showed a similar container formed also of plastic.

9. CONCLUSION

For reasons thus given, it is considered that the rejection of Claims 1-12 under 35 U.S.C. 103(a) as unpatentable over Malone et al. is considered to lack merit. It is therefore

requested that this Honorable Board reverse the decision of the Primary Examiner and allow Claims 1-12, all the claims on appeal.

Respectfully submitted,

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APPENDIX

The claims on appeal are:

1. (Four Time Amended) A ceramic passive component which comprises a carrier substrate (1),
at least one first electrode (2) formed of a material selected from the group consisting of metals and alloys and having a first surface disposed, on the substrate,
at least one thin film dielectric (5) of a thickness in the range of about 0.25-0.75μm having a first surface disposed, on a second surface of the at least one first electrode opposing said first surface of the at least one first electrode, and
at least one second electrode (6) disposed on a second surface of the at least one dielectric opposing said first surface of the at least one dielectric,
wherein the at least one thin film dielectric (5) comprises a ferroelectric ceramic material with a voltage-dependent relative dielectric constant ε_r.

2. (Twice Amended) A ceramic passive component as claimed in claim 1, wherein the ferroelectric ceramic material with a voltage-dependent dielectric constant ε_r is a material selected from the group consisting of:
$Pb(Zr_xTi_{1-x})O_3$ $(0 \leq x \leq 1)$ with and without excess lead, $Ba_{1-x}Sr_xTiO_3$ $(0 \leq x \leq 1)$,

$Pb_{1-1.5y}La_y(Zr_xTi_{1-x})O_3$ ($0 \leq x \leq 1$, $0 \leq y \leq 0.2$), $Pb(Zr_xTi_{1-x})O_3$ ($0 \leq x \leq 1$) doped with Nb, $Pb_{1-\alpha y}La_yTiO_3$ ($0 \leq y \leq 0.3$, $1.3 \leq \alpha \leq 1.5$), $(Pb,Ca)TiO_3$, $BaTiO_3$ with and without dopants, $SrZr_xTi_{1-x}O_3$ ($0 \leq x \leq 1$) with and without Mn dopants, $BaZr_xTi_{1-x}O_3$ ($0 \leq x \leq 1$), $SrTiO_3$ doped with, for example, La, Nb, Fe or Mn,

$(Pb(Mg_{1/3}Nb_{2/3})O_3)_x-(PbTiO_3)_{-x}$ ($0 \leq x \leq 1$),

$(Pb,Ba,Sr)(Mg_{1/3}Nb_{2/3})_xTi_y(Zn_{1/3}Nb_{2/3})_{1-x-y}O_3$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $x + y \leq 1$), $PbNb_{4/5x}((Zr_{0.6}Sn_{0.4})_{1-y}Ti_y))_{1-x}O_3$ ($0 \leq x \leq 0.9$, $0 \leq y \leq 1$), $(Ba_{1-x}Ca_x)TiO_3$ ($0 \leq x \leq 1$),

$(Ba_{1-x}Sr_x)TiO_3$ ($0 \leq x \leq 1$), $(Ba_{1-x}Pb_x)TiO_3$ ($0 \leq x \leq 1$), $(Ba_{1-x}Sr_x)(Ti_{1-x}Zr_x)O_3$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$),

(a) $Pb(Mg_{1/2}W_{1/2})O_3$,

(b) $Pb(Fe_{1/2}Nb_{1/2})O_3$,

(c) $Pb(Fe_{2/3}W_{1/3})O_3$,

(d) $Pb(Ni_{1/3}Nb_{2/3})O_3$,

(e) $Pb(Zn_{1/3}Nb_{2/3})O_3$,

(f) $Pb(Sc_{1/2}Ta_{1/2})O_3$,

as well as combinations of any of the materials (a) to (f) with $PbTiO_3$ and $Pb(Mg_{1/3}Nb_{2/3})O_3$ with and without excess lead.

3. (Amended) A ceramic passive component as claimed in claim 1, wherein the at least one first electrode (2) or the at least one second electrode (6) comprise(s) at least a first and a second electrically conducting layer.

4. (Amended) A ceramic passive component as claimed in claim 3, wherein the first electrically conducting layer of the at least first electrode(2) or of the at least one second electrode (6) comprises Ti, Cr, Ni_xCr_y ($0 \leq x \leq 1$, $0 \leq y \leq 1$) or Ti_xW_y ($0 \leq x \leq 1$, $0 \leq y \leq 1$).

5. (Twice Amended) A ceramic passive component as claimed in claim 3, wherein the second electrically conducting layer of the at least one first electrode (2) or of the at least one second electrode (6) comprises a metal or an alloy.

6. (Amended) A ceramic passive component as claimed in claim 1, wherein the carrier substrate (1) comprises a ceramic material, a ceramic material with a glass planarization layer, a glass-ceramic material, a glass material, or silicon.

7. (Amended) A ceramic passive component as claimed in claim 1, wherein the at least one dielectric (5) comprises multiple layers.

8. (Twice Amended) A ceramic passive component as claimed in claim 1, wherein a protective layer (7) is laid over the entire component.

9. (Thrice Amended) A voltage-controlled oscillator with as its capacitive component a ceramic passive component which comprises

a carrier substrate (1), at least one first electrode (2) formed of a material selected from the group consisting of metals and alloys and having a first surface disposed on the substrate, at least one thin film dielectric (5) of a thickness in the range of about 0.25-0.75μm having a first surface disposed, on a second surface, opposed to said first surface of the at least first electrode, and at least a second electrode (6) disposed on a second surface of the at least one thin film dielectric, opposed to said first surface of the at least one dielectric, wherein the at least one thin film dielectric (5) comprises a ferroelectric ceramic material with a voltage-dependent relative dielectric constant ε_r.

10. (Four Times Amended) A filter with as its capacitive component a ceramic passive component which comprises a carrier substrate (1), at least one first electrode (2) formed of a material selected from the group consisting of metals and alloys and having a first surface disposed on the substrate, at least one thin film dielectric (5) of a thickness in the range of about 0.25-0.75μm having a first surface disposed on a second surface of the at least one first electrode opposed to said first surface and at least one second electrode (6) having a surface disposed on said second surface of the at least one thin film dielectric wherein the at least one thin film dielectric (5) comprises a ferroelectric ceramic material with a voltage-dependent relative dielectric constant ε_r.

11. (Thrice Amended) A delay line with as its capacitive component a ceramic passive component which comprises a carrier substrate (1), at least one first electrode formed of a material selected from the group consisting of metal and alloys and (2) having a first surface disposed on the substrate at least one thin film dielectric (5) of a thickness in the range of about 0.25-0.75μm having a first surface disposed on a second surface of the one first electrode opposed to said first surface and at least one a second electrode (6) having a surface disposed on said second surface of the at least one thin film dielectric wherein the at least one thin film dielectric (5) comprises a ferroelectric ceramic material with a voltage-dependent relative dielectric constant ε_r.

12. (Thrice Amended) A capacitive ceramic comprising a carrier substrate (1), at least one first electrode (2) formed of a material selected from the group consisting of metals and alloys and having a first surface disposed on the substrate at least one dielectric (5) of a thickness in the range of about 0.25-0.75μm with a voltage-dependent relative dielectric constant ε_r having a second surface opposed to said first surface disposed on a second surface of the at least one first electrode opposed to said first surface and at least one second electrode (6) disposed on said second surface of the at least one thin film dielectric as a capacitive component.